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### (54) Sealing arrangements

(57) A sealing arrangement for sealing between a window frame (18,20) carried by the upper part of a vehicle door and the frame (16,16A) of the door opening, comprises a sealing strip (36). An outer frame member (18) of the window frame extends in a peripherally outward direction of the window opening and is curved-over in re-entrant form to define a rigid channel (19). An inner frame member (20) of the window frame extends into this channel and is welded to the outer frame member (18). The sealing strip (36) has a locking portion (41) comprising a flexible wall (42) of a hollow chamber (46). The flexible wall (42) can be partially depressed into the hollow chamber (46) to enable the locking portion to pass into the rigid channel (19), whereafter the wall (42) resiles to lock the sealing strip (36) in position. The flexible material of the sealing strip (36) may be co-extruded with harder material (36B) for reinforcement purposes and, in particular, for holding an integral sealing lip (38) firmly in position against the window frame (18). The outer and inner window frame members (18,20) support a second rigid channel (22) which in turn supports a flexible channel (24) for receiving the window glass (14).

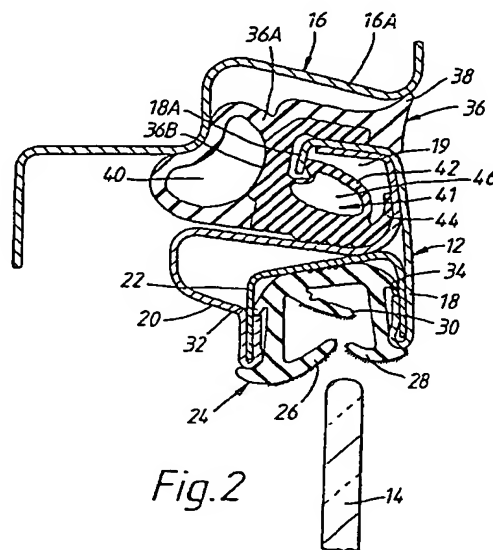


Fig.2

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## Description

The invention relates to a sealing arrangement for providing a seal between the frame of a window opening carried by the upper part of a vehicle body door and the frame of the door opening, comprising means carried by the window frame for defining a rigid channel, and a sealing strip made of flexible material for attachment to the window frame, the sealing strip having an integral locking portion arranged to enter the rigid channel and including means which flexes to allow entry of the locking portion into the rigid channel and which thereafter resiles to engage an edge in or adjacent the rigid channel to lock the sealing strip in position, the sealing strip including a sealing portion which extends between the window frame and the frame of the door opening when the sealing strip is mounted in position.

Such an arrangement is shown in FR-A-2 648 887. In this known arrangement, however, the locking portion comprises a relatively thick and stiff member of lesser cross-sectional size than the aperture and which, during the fitting process, passes through the aperture. On one of its longitudinally extending faces, an integral lip extends substantially perpendicularly to engage one edge of the aperture, and the opposite longitudinally extending face defines a groove for engaging the rigid formation along the opposite edge of the aperture. The lip therefore has to flex in order to enable the locking portion to enter the aperture so that the groove can engage the rigid formation. If the lip is sufficiently flexible or hingeable to enable easy fitting, the sealing strip may not be adequately secured in position. If the lip is less flexible or hingeable, fitting will be more difficult and so also will be disassembly (e.g. for recycling purposes). Furthermore, in this known arrangement, the rigid channel is disposed around the window frame and on one side thereof (on the inside of the vehicle). The effect of this is to increase the overall thickness of the window frame as measured from the inside to the outside of the vehicle. The invention aims to overcome these problems.

In accordance with the invention therefore, the known sealing arrangement as first set forth above is characterised in that the locking portion terminates in wall means forming at least part of the wall of a hollow chamber in the locking portion whereby to enable the wall means to be at least partially depressed into the hollow chamber to enable the locking portion to enter the rigid channel, the wall means thereafter resiling to hold the sealing strip in position, and the rigid channel is disposed peripherally outwardly of the window frame.

Sealing arrangements embodying the invention, and for use in motor vehicle body construction, will now be described, by way of example only, with reference to the accompanying diagrammatic drawings in which:-

Figure 1 is a perspective view of a motor vehicle;

Figure 2 is a section on the line A-A of Figure 1,

showing one of the arrangements;

Figure 3 is a section corresponding to Figure 2 but showing a modified form of the arrangement of Figure 2;

Figure 4 is a section corresponding to Figure 2 but showing another of the arrangements; and

Figure 5 is a section corresponding to Figure 2 but showing a modified form of the arrangement shown in Figure 4.

The motor vehicle shown in Figure 1 has a door 10 carrying an upper window frame 12 receiving a window glass 14. The door opening is defined by the "A" and "B" pillars of the vehicle body, by the door sill, and by the roof 16.

Figure 2, being a section on the line A-A of Figure 1, shows the window frame 12 running around the window opening which receives the window glass 14. The window frame 12 is in this example made of metal and comprises outer and inner frame members 18 and 20 respectively. These frame members support a metal channel 22 and have curved-over ends for receiving, and which are welded to, the walls of the metal channel 22. The outer frame member 18 extends upwardly above the channel 22 where it meets the upper part of the inner frame member 20 and is welded to it. The outer frame member 18 has a curved-over rigid lip 18A so as to define a rigid channel 19 facing inwardly of the window opening.

The metal channel 22 receives and supports a window sealing, trimming and guiding strip 24. This is made of extruded plastics or rubber material, for example, and has lips 26 and 28 extending partway across its mouth for resiliently and sealingly contacting opposite sides of the window glass 14 as the latter rises upwardly during closure of the window. The outwardly facing surfaces of the lips 26,28 may be covered with flock.

A further sealing lip 30 is flexibly mounted at the base of the channel 24 for sealing against the edge of the glass 14.

The window channel 24 is fixed within the metal channel 22 by means of longitudinal shoulders 32,34 running along its outside side walls which engage against the edges of the curved-over outer and inner window frame members 18,20, so as to hold the channel 24 in position.

The window frame 12 also supports an outer door seal indicated generally at 36. The purpose of the seal 36 is to provide a seal between the window frame 12 and the vehicle roof 16, the panel defining the roof at this position being indicated at 16A.

The seal 36 has a roof-engaging lip 38 which, when the door is closed (as shown in the Figure), provides a seal for the gap between the outer window frame member 18 and the roof panel 16A. In addition, the seal 36 has an integral sealing section 40 of generally hollow

tubular form. When the door is closed, this sealing section 40 provides an additional seal against the roof panel 16A.

Seal 36 is secured in position on the window frame 12 by means of a locking portion 41 comprising a flexible longitudinally extending wall 42 and a lip 44. The wall 42 is the outer wall of a hollow chamber 46. The hollow chamber 46 enables the wall 44 to be hinged or depressed so as to collapse the chamber 46. This enables the seal 36 to be fitted over the rigid metal lip 18A, whereafter the wall 42 resiles into the position illustrated and secures the seal 36 firmly in position.

The seal 36 is advantageously extruded from suitable plastics or rubber material. In the form shown in Figure 2, the seal 36 is extruded from rubber material and is in two co-extruded parts: a relatively soft part 36A and a relatively harder part 36B. The harder part 36B provides added strength for the seal, particularly for holding it firmly in position in the window frame. In addition, the relatively harder part 36B strengthens the lip portion 38 and holds it firmly against separation from the upwardly facing outer surface of the outer frame member 18. Any such separation here might allow ingress of water or moisture.

In Figure 3, items corresponding to those in Figure 2 are similarly referenced. In Figure 3, the seal 36 is not extruded from hard and soft material 36A, 36B as in Figure 2; instead, all the material is of the same hardness.

Items in Figure 4 corresponding to items in the other Figures are similarly referenced.

In the arrangement shown in Figure 4, the window frame 12 is of slightly different construction. The outer frame member 18 is not extended upwardly in re-entrant form to form the inwardly facing channel 19 of Figures 2 and 3. Instead, it is curved over on itself to receive, and be welded to, the inner frame member 20 on the outside of the window frame. In addition, the window frame has an extra frame member 50 which is welded to the inner frame member 20 and then extends upwardly so as to define one side wall of an outwardly facing channel 52 whose other side wall is defined by the flange formed where the outer and inner window frame members 18, 20 are welded together.

In the arrangement of Figure 4, the seal 36 is thus fitted in position by being moved vertically downward into the channel 52. The body of the seal 36 is thus extruded to provide a channel 54 for embracingly gripping the extra frame member 50. The channel 54 may be provided with integral gripping lips 56 for frictionally gripping opposite faces of the frame member 50.

The locking portion 41 in Figure 4 extends downwardly into the channel 52 when the seal is fitted in position and comprises the hollow chamber 46 with two outwardly facing mutually inclined walls 42A and 42B. When the locking portion 41 is inserted into the channel 52 (so that the channel 54 of the seal 36 embraces the frame member 50), the hollow chamber 46 is partially compressed to allow the walls 42A, 42B to enter the channel 52. When the seal is fully fitted, the material

resiles and the walls 42A, 42B expand outwardly so that their distal edges engage a longitudinal shoulder 58 on one side of the frame member 50 and the curved-over edge of the outer frame member 18. In this way, the seal 36 is firmly held in position.

The seal 36 includes reinforcements in the form of an embedded generally flat metal strip 60 and a separate metal strip 62 which is of right-angled form with a bent-over edge 62A extending into the lip 38. The reinforcement 62, and particularly its bent over edge 62A, reinforce the lip 38 and help to ensure that it remains properly seated on the distal edge of the bent-over outer frame member 18.

The reinforcements 60, 62 may be made of unapertured metal strips. Instead, however, they may be apertured, such as provided with slots or slits, so as to increase their flexibility. They can be incorporated into the material of the seal 36 by means of a known cross-head extrusion process.

The material of the seal 36 also includes a subsidiary hollow chamber 66 which provides increased flexibility for easing the fitting of the seal into position.

In the arrangement of Figure 5, items corresponding to those in the other Figures are correspondingly referenced. In the arrangement of Figure 5, the two separate reinforcements 60, 62 are replaced by a single channel-shaped reinforcement or carrier 70 which embraces the channel 54.

The seal 36, as shown in each Figure, may be arranged to run not only along the top of the door but also along its sides.

#### Claims

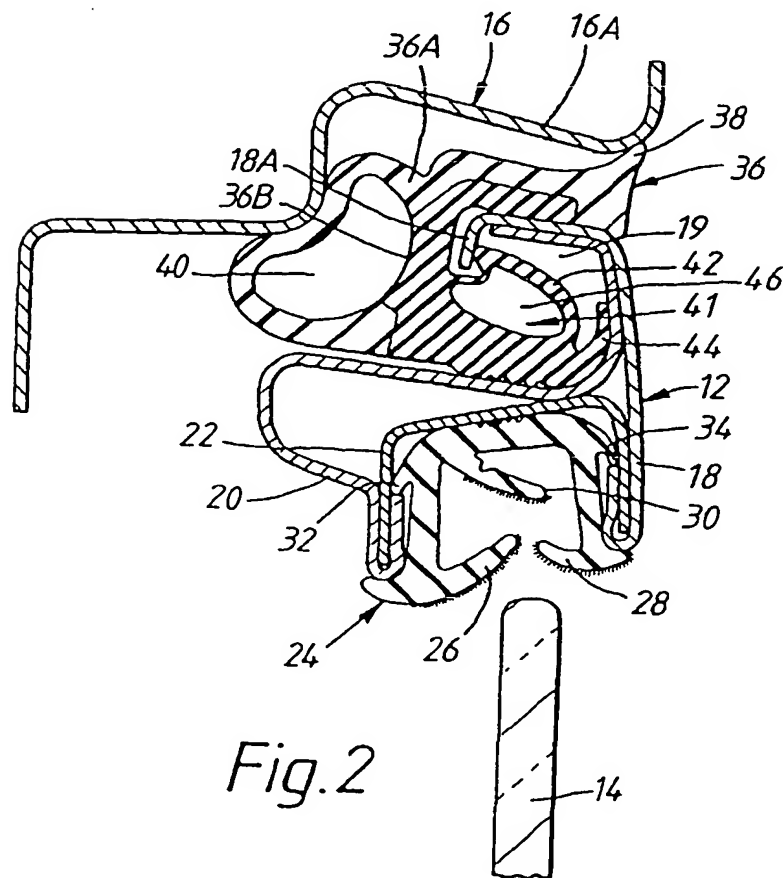
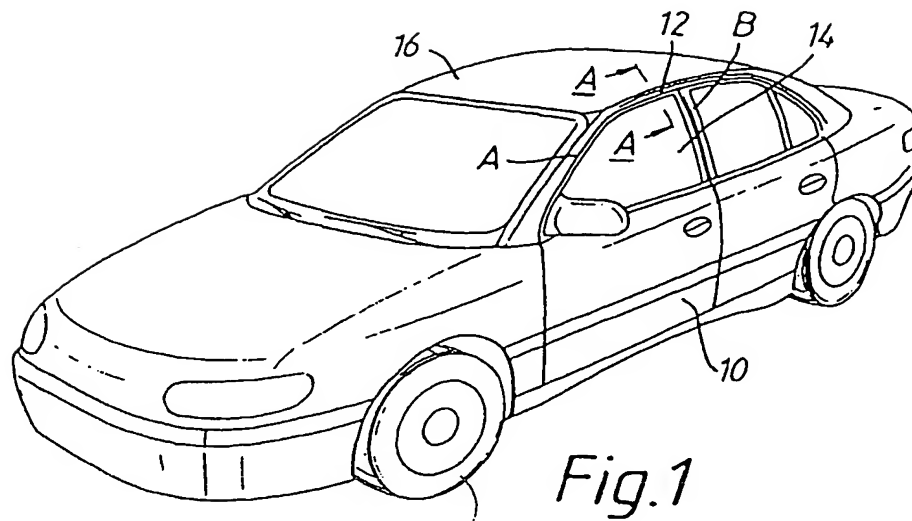
1. A sealing arrangement for providing a seal between the frame (12) of a window opening carried by the upper part of a vehicle body door and the frame (16) of the door opening, comprising means carried by the window frame (12) for defining a rigid channel (19; 52), and a sealing strip (36) made of flexible material for attachment to the window frame, the sealing strip (36) having an integral locking portion (41) arranged to enter the rigid channel (19; 52) and including means (42) which flexes to allow entry of the locking portion (41) into the rigid channel (19; 52) and which thereafter resiles to engage an edge in or adjacent the rigid channel (19; 52) to lock the sealing strip (36) in position, the sealing strip (16) including a sealing portion (38, 40) which extends between the window frame (12) and the frame (16) of the door opening when the sealing strip (36) is mounted in position, characterised in that the locking portion (41) terminates in wall means (42) forming at least part of the wall of a hollow chamber (46) in the locking portion (41) whereby to enable the wall means (42) to be at least partially depressed into the hollow chamber (46) to enable the locking portion (41) to enter the rigid channel (19; 52), the wall means (42) thereaf-

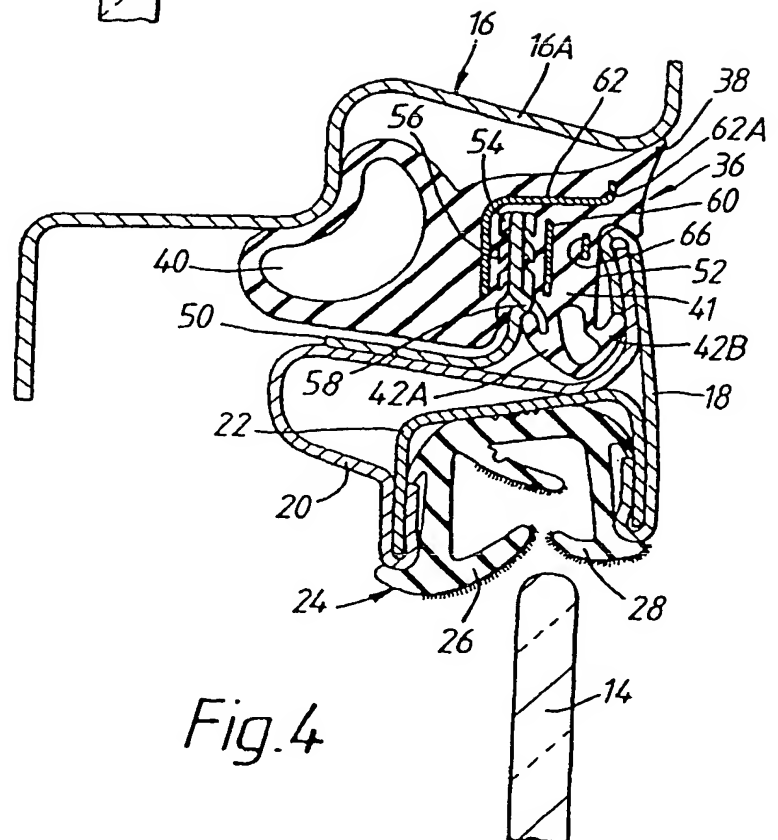
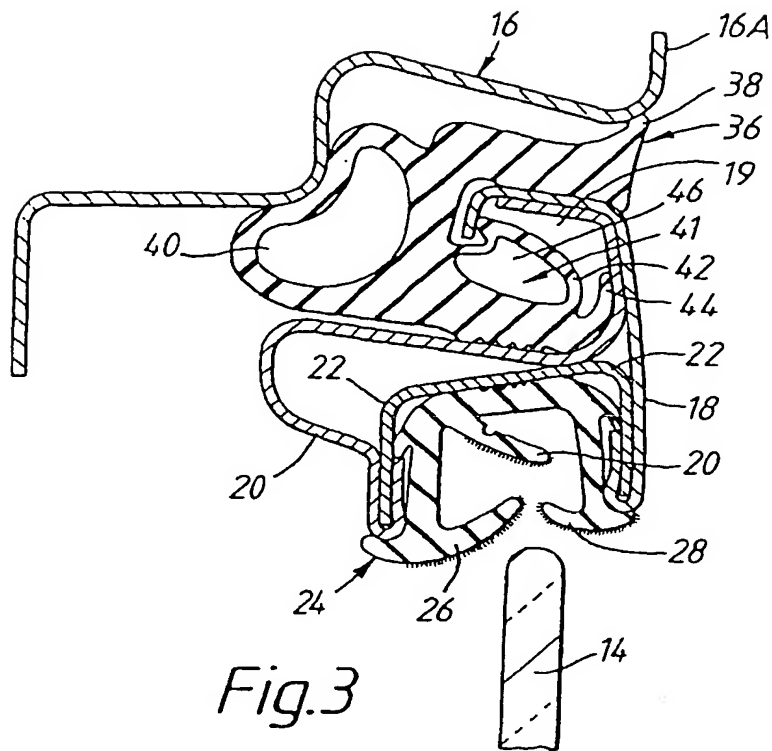
ter resiling to hold the sealing strip (36) in position, and the rigid channel (19;52) is disposed peripherally outwardly of the window frame (12).

2. An arrangement according to claim 1, characterised in that the rigid channel (19) faces inwardly of the window opening. 5
3. An arrangement according to claim 2, characterised in that the rigid channel (19) is formed at least in part by a rigid member (18) of the window frame (12) which extends peripherally outwardly from the window frame (12) and is bent over in reentrant form to define the rigid channel (19). 10
4. An arrangement according to claim 1, characterised in that the rigid channel (52) faces outwardly away from the window opening. 15
5. An arrangement according to claim 4, in which the side wall of the rigid channel (52) is defined at least in part by an outer frame member (18,20) of the window frame (12) which extends in a peripherally outwardly direction of the window frame. 20
6. An arrangement according to claim 5, characterised in that the opposite side wall of the rigid channel (52) is defined by another part (50) of the window frame. 25
7. An arrangement according to claim 6, characterised in that the flexible material of the sealing strip defines a channel (54) for embracingly gripping the said opposite side wall (50) of the rigid channel (52). 30
8. An arrangement according to any preceding claim, in which the wall means (42) of the locking portion (41) comprises two walls generally inclined to each other and meeting at a ridge extending longitudinally of the strip. 40
9. An arrangement according to any preceding claim, characterised in that the wall means (42) of the locking portion (41) defines a longitudinally extending shoulder for lockingly engaging a formation extending along and within the rigid channel (52) after resiling of the wall means (42). 45
10. An arrangement according to any preceding claim, characterised in that the flexible material of the sealing strip (36) is reinforced. 50
11. An arrangement according to claim 10, characterised in that the flexible material of the sealing strip (36) is reinforced by embedded harder material (36B,60,62,66;70). 55
12. An arrangement according to claim 11, character-

ised in that the sealing (36) strip is made by extrusion and the harder material (36B) is co-extruded material.

13. An arrangement according to any one of claims 10 to 12, characterised in that the reinforcement (60,62,66;66,70) is embedded metal reinforcement.
14. An arrangement according to any one of claims 10 to 13, characterised in that the embedded metal reinforcement (62) extends into the said sealing portion (38).
15. An arrangement according to any preceding claim, characterised in that the window frame (12) also defines support means (22) facing in a peripherally inward direction of the window frame (12) for supporting a window guide channel (24).
16. An arrangement according to claim 15, characterised in that the support means (22) comprises a second rigid channel (22).





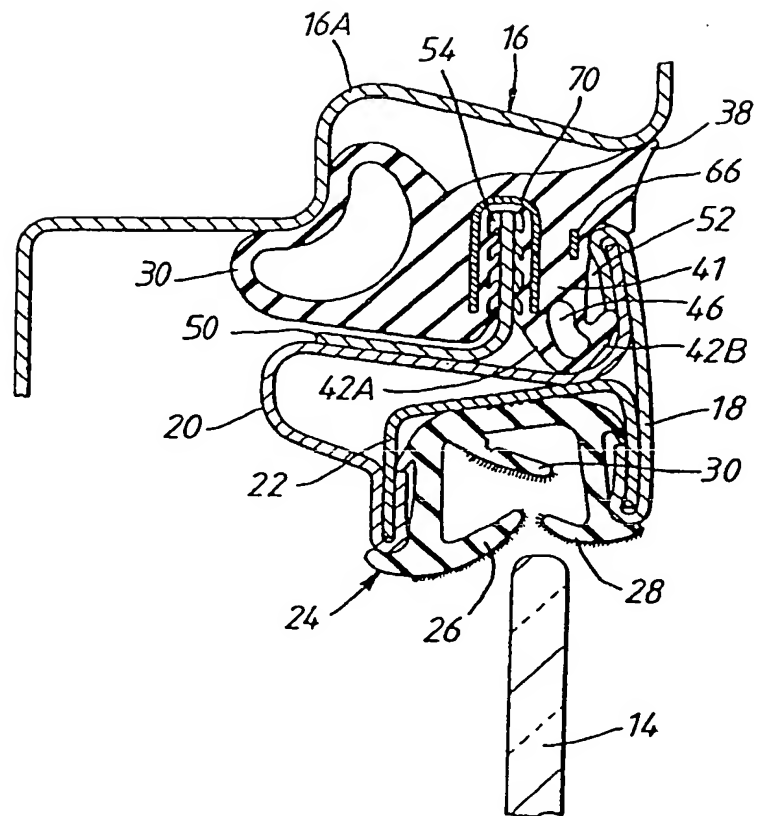


Fig. 5



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## EUROPEAN SEARCH REPORT

Application Number  
EP 96 30 8426

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	FR 2 580 326 A (YMOS) * figure 2 *	1	B60J10/08 B60J10/00
A	FR 2 714 334 A (TECHNISTAN) * figures 1,2 *	1	
A	FR 2 645 091 A (SMADJA) * figures 1,2 *	1	
A	EP 0 459 219 A (METZELER) * figure 1 *	1	
A	DE 195 17 756 A (SANKEI GIKEN KOGYO) * figures 2-5 *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B60J
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14 May 1997	Examiner Kusardy, R
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